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Scenario of some waterborne diseases in slums of Mumbai city

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Abstract
Mumbai is one of the largest mega cities in the world in terms of population. More than 57% population lives in the slums of Mumbai. In this study we have considered various studies concerning with waterborne disease in slums of Mumbai city. In the last section of the study discussion is made for future perspective.

Keywords: waterborne disease, slums, Mumbai

Introduction

Mumbai (formerly known as Bombay) is located on the Western seacoast of India on the Arabian Sea at $18^0$53' N to $19^0$16' N latitude and 72^0 E to $72^0$59' E longitude. Mumbai occupies an area of 468 square kilometers (sq. km.) and its width is 17 km. East to West and 42 km. North to South [1].As having flood prone location this city is more vulnerable to climate risks and the most vulnerable section is the slum dwellers and squatter communities in the city [2].

According to the 2001 Census, Mumbai was found having highest percentage of slum population in Mumbai (48.88%). Slum population that needed attention was about 33.1 million in 1985. In early90's it was figured over 35 million whereas in 2001 it was found observed over 40 million [3].

In this study we have considered various factors e.g. slum population, urban slums, squatter, pavement dweller communities, living conditions, hygiene, income, safe drinking water, Diarrhea, Cholera, Malaria, parasitic infections, eye infections, sanitation, morbidity, mortality, warmer climate, sea-surface temperature, sea- surface height, the emergence of insecticide, drug resistance, human population growth and movement, change of land-use, public health infrastructure, changes in temperature, rainfall, humidity, immunity levels, water consumption pattern, prevalence of morbidity and age distribution etc. We present here the scenario of slums of the Mumbai city to pinpoint the gaps which may be address further.

Usually the living conditions in slums are not hygienic and are important factor in accelerating transmission of various air and water borne diseases. Under section 3 of the Slum Areas (Improvement and Clearance) Act, 1956 slums are defined as areas where buildings are in any respect unfit for human habitation [4].

According to UNICEF 2012, population lives in slums is one-third of the world's population and over 90% of slum dwellers belongs to low-income and middle-income countries, including hundreds of millions of children [5-6].

Safe drinking water is one of the essentials for good health but more than 1.4 billion people in developing countries lack access to safe drinking water (World Resources (1998 – 99) Poverty, Health and the Environment.). From diseases linked to poor water quality, about 2.3 billion people suffer worldwide [4].

Slums concentrate many known risk factors for parasitic, water- borne and vector-borne diseases [7].

Water and sanitation related diseases such as Diarrhea, Parasitic infections, and Eye infections, account for much of the morbidity and mortality in developing countries [8-9].

According to The World Bank, in the Indian context, 21% of all communicable diseases are water related and every year 1.5 million children under 5 years die due to water related diseases [10-11].

It was reported that around 3.3 million people die yearly due to diseases resulting from poor sanitation. A large investigation from Mumbai covering 1070 households showed that poor sanitary conditions were responsible for at least 30% of the morbidity [12].

As it is known that standing water is associated with increased risk of mosquito-borne and other vector-borne diseases in children, such as Dengue, which is further exacerbated by poor housing and high population densities [13]. A warmer climate could also cause water-borne diseases to become more frequent, including Cholera and Diarrheal diseases [14-22] and decreased access to safe drinking water and adequate sanitation also contribute to waterborne illness [23-25].

The World Bank estimates that India specifically loses 6.4% of its gross domestic product (GDP) every year to water and sanitation-related diseases [26]. Morbidity is an established fact that open defecation is a serious threat to environmental sanitation [27-28].

If we put our concentration on Diarrhea, Diarrheal diseases are a major cause of morbidity and mortality in particularly among children [29]. Diarrheal diseases were found largely attributable to unsafe drinking water and lack of basic sanitation; resulting an increase in the incidence of such diseases [30].

According to Sundari S around 4 billion cases of Diarrheal disease occur every year causing 3 to 4 million deaths mostly among children [4].

WHO 2010 reported that, in slums, infants who live without piped water have up to 4.8 times the risk of death from Diarrhea [31-33]. Whereas in New Delhi also, Diarrhea was found accountable for 36% of infant mortality and 50% of child mortality under 7 years of age [31, 33, 35]

As far as Cholera is concerned, it is a well-known water-borne Diarrheal disease that has afflicted humankind since ancient

times. Study disclosed a relationship between increase in sea-surface temperature and the Cholera epidemics, with the Cholera outbreaks following the seasonal rise and fall in sea-surface height and temperature [14, 36].

If we consider another waterborne disease called Malaria, it is one of the most serious and complex public health problems. About 400-500 million cases of Malaria and more than 1 million Malaria-related deaths occur globally each year [37]. Malaria is one of the most important vector-borne diseases in India, Bangladesh, and Sri Lanka. According to Hales S, changes in temperature and precipitation patterns have the potential to expand the geographical range of Malaria into temperate and arid parts of South Asia [14].There are several factors causing the global resurgence of Malaria, e.g. the emergence of insecticide and drug resistance, human population growth and movement, change of land-use, deteriorating public health infrastructure, changes in temperature, rainfall, humidity, and immunity levels also affect Malaria transmission [38].

Garg A *et al*. reported that more than 973 million persons were found exposed to vector-borne Malarial parasites in India, and in 1998, 577,000 disability adjusted life years (DALYs) were observed lost due to Malaria [39].

Rainfall alone was reported accounting for about 45 per cent of the variation in Malaria transmission in one of the study. This study also reported that by the 2050s, the geographic range of Malaria vectors is projected to shift away from central regions toward southwestern and northern States [40].

In one of the field surveys, conducted in Mumbai, on four slum, squatter and pavement dweller communities with a sample of 1,070 households. In this study low water consumption pattern was found averaging 30 l/c.d. The annual Diarrheal, Typhoid and Malaria cases were found estimated to 614, 68 and 126 per thousand populations respectively. 30% prevalence of all morbidity was observed accounted for by water-related infections. In the same study prevalence rate of some selected water-borne diseases e.g. Typhoid, Cholera, Jaundice, Malaria, Intestinal were reported 36,3,0,59,98 per thousand respectively in Malad, in Rajiv Gandhi Nagar this rate was found 38, 26,30, 26, 1 per thousand respectively. The prevalence rate of these diseases discussed was observed 46, 7, 13, 44, 133 respectively in Mukund Nagar and 68, less than 1, 68, 126, 353 respectively in Pavement Dwellers [41]. Sharma *et al*., found that particularly, in Mumbai, the ratio and number of urban poor were increasing as their share to total city population was 12% in 1961 but 51% in 1991 [42].

We came across another study conducted, considering a total of 203 households. In this study baseline data was provided by 2922 households in the community. Study disclosed 400 households with complete Diarrhea cases during the study period and 49 homes were observed reporting cases twice within the study period and 9 households observed 3 weeks with a case of Diarrhoea. If we talk about age distribution of cases, 35% of cases were accounted for all children under 5 years of age, whereas only 11% were under 1-yearo. Cases aged 5–18 years accounted for another 25% of cases and adults made up the reaming 40% [43].

Discussion

Today, India has made noticeable progress in almost all the fields. However, still there is a huge span in terms of reaching the last of its rural population and urban poor. There are several areas that may be targeted for immediate and appropriate public action to mitigate the effects of slums on child health. There is a need to improve the physical environment of the dwelling places like basic amenities of toilets, proper drainage, sewerage system and adequate water supply, so that improved facilities can be used and continued in the future.

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